## CLAIMS

1. A dynamic pressure bearing device comprising a base, a shaft fixed to the base, and a sleeve rotatably arranged around the shaft, characterized in that:

a circular thrust plate, which is provided on the shaft and has a diameter larger than that of the shaft portion, and the shaft are formed integrally of a stainless steel into a shaft member;

the sleeve is formed of an aluminum silicon alloy containing aluminum and silicon as components, the sleeve having an inner diameter ranging from 0.6 to 3 mm;

the shaft member has a coefficient of linear expansion of $17 \times 10^{-6} \pm 5\%$;

the sleeve has a coefficient of linear expansion of $14 \times 10^{-6} \pm 5\%$ as measured in a measurement range of 0°C to 100°C;

a thrust plate portion has an axial thickness of 0.15 to 0.35 mm;

a hardness of the sleeve is lower than that of the shaft, with a radial bearing dynamic pressure groove being provided in a portion of the sleeve, which is a softer member, opposed to the shaft; and

a counter plate is provided at a position opposed to the thrust plate so as to cover the thrust plate and to close a central hole of the sleeve, a first thrust dynamic pressure groove for a thrust bearing is provided at a position of the counter plate opposed to the thrust plate, and a second thrust dynamic pressure groove is provided in a portion of the sleeve opposed to a surface opposite to the surface of the thrust plate opposed to the first thrust dynamic pressure groove.

2. A dynamic pressure bearing device comprising a shaft, a sleeve provided around the shaft so as to be capable of relative rotation, and a base to which one of the shaft and

the sleeve is fixed, characterized in that:

the shaft is formed of a stainless steel;

the sleeve is formed of an aluminum silicon alloy containing aluminum and silicon as components;

the shaft has a coefficient of linear expansion of $17 \times 10^{-6} \pm 5\%$;

the sleeve has a coefficient of linear expansion of $11 \times 10^{-6}$ to $16.5 \times 10^{-6}$ as measured in a measurement range of 0°C to 100°C; and

a hardness of the sleeve is lower than that of the shaft, with a dynamic pressure groove for a radial bearing being provided in a portion of the sleeve, which is a softer member, opposed to the shaft.

3. A dynamic pressure bearing device comprising a shaft, a sleeve provided around the shaft so as to be capable of relative rotation, and a base to which one of the shaft and the sleeve is fixed, characterized in that:

the sleeve is formed of an aluminum silicon alloy containing 65 to 69% by weight of Al, 28 to 32% by weight of Si, and 1 to 5% by weight of Cu, etc., the sleeve having a coefficient of linear expansion smaller than that of the shaft by $0.5 \times 10^{-6}$ to $7 \times 10^{-6}$, the sleeve having a hardness lower than that of the shaft, and a dynamic pressure groove for a radial bearing is provided in a portion of the sleeve, constituting a softer member, opposed to the shaft.

4. A dynamic pressure bearing device comprising a shaft, a sleeve provided around the shaft so as to be capable of relative rotation, and a base to which one of the shaft and the sleeve is fixed, characterized in that:

the shaft is equipped with a thrust plate;

the sleeve is formed of an aluminum silicon alloy containing aluminum and silicon as components;

the shaft is formed of a stainless steel made of an iron type alloy containing 10.5 to 32% by weight of Cr and 4 to 13% by weight of Ni; and

a dynamic pressure groove for a radial bearing is provided in an inner peripheral surface of the sleeve which is a portion of the sleeve opposed to the shaft, a first thrust dynamic pressure groove for a thrust bearing is provided at a position of a counter plate opposed to the thrust plate, the counter plate being provided at a position opposed to the thrust plate so as to cover the thrust plate and to close a central hole of the sleeve, and a second thrust dynamic pressure groove is provided in a portion of the sleeve opposed to a surface opposite to the surface of the thrust plate opposed to the first thrust dynamic pressure groove.

5. A dynamic pressure bearing device comprising a shaft, a sleeve provided around the shaft so as to be capable of relative rotation, and a base to which one of the shaft and the sleeve is fixed, characterized in that:

the sleeve is formed of an aluminum silicon alloy containing aluminum and silicon as components and increasing in coefficient of linear expansion with temperature rise at least in a range of 0°C to 100°C, the shaft having a coefficient of linear expansion larger than the coefficient of linear expansion of the sleeve and constant within the temperature range, the sleeve having a hardness lower than a hardness of the shaft, and a dynamic pressure groove for a radial bearing is provided in a portion of the sleeve, constituting a softer member, opposed to the shaft.

6. A dynamic pressure bearing device according to any one of Claims 2, 3, 4, and 5,

characterized in that the inner diameter of the sleeve ranges from 0.6 to 3 mm.

7. A spindle motor comprising a base, a shaft fixed to the base, a sleeve rotatably arranged around the shaft, a hub or a rotor adapted to rotate integrally with the sleeve, and a stator fixed to the base, characterized in that:

a circular thrust plate, which is provided on the shaft and has a diameter larger than that of the shaft portion, and the shaft are formed integrally of a stainless steel as a first integral member;

the sleeve and the hub, or the sleeve and the rotor, are formed integrally as a second integral member of an aluminum silicon alloy containing aluminum and silicon as components, the sleeve having an inner diameter ranging from 0.6 to 3 mm;

the first integral member has a coefficient of linear expansion of $17 \times 10^{-6} \pm 5\%$;

the second integral member has a coefficient of linear expansion of $14 \times 10^{-6} \pm 5\%$ as measured in a measurement range of 0°C to 100°C;

the second integral member has a lower hardness than the first integral member, with a radial bearing dynamic pressure groove being provided in a portion of the second integral member, constituting a softer member, opposed to the shaft; and

a counter plate is provided at a position opposed to the thrust plate so as to cover the thrust plate and to close a central hole of the sleeve, a first thrust dynamic pressure groove for a thrust bearing is provided at a position of the counter plate opposed to the thrust plate, and a second thrust dynamic pressure groove is provided in a portion of the sleeve opposed to a surface opposite to the surface of the thrust plate opposed to the first thrust dynamic pressure groove.

8. A spindle motor comprising a base, a shaft fixed to the base, a sleeve rotatably

arranged around the shaft, a hub or a rotor adapted to rotate integrally with the sleeve, and a stator fixed to the base, characterized in that:

the shaft is formed of a stainless steel;

the sleeve and the hub, or the sleeve and the rotor, are formed integrally as an integral member of an aluminum silicon alloy containing aluminum and silicon as components;

the shaft has a coefficient of linear expansion of $17 \times 10^{-6} \pm 5\%$;

the integral member has a coefficient of linear expansion of $11 \times 10^{-6}$ to $15 \times 10^{-6}$ as measured in a measurement range of 0°C to 100°C; and

a hardness of the integral member is lower than that of the shaft, with a dynamic pressure groove for a radial bearing being provided in a portion of the integral member, which is a softer member, opposed to the shaft.

9. A spindle motor comprising a base, a shaft fixed to the base, a sleeve rotatably arranged around the shaft, a hub or a rotor adapted to rotate integrally with the sleeve, and a stator fixed to the base, characterized in that:

the sleeve and the hub, or the sleeve and the rotor, are formed integrally as an integral member of an aluminum silicon alloy containing 65 to 69% by weight of Al, 28 to 32% by weight of Si, and 1 to 5% by weight of Cu, etc., the integral member having a coefficient of linear expansion smaller than that of the shaft by $1 \times 10^{-6}$ to $7 \times 10^{-6}$, the integral member having a hardness lower than that of the shaft, and a dynamic pressure groove for a radial bearing is provided in a portion of the integral member, constituting a softer member, opposed to the shaft.

10. A spindle motor comprising a base, a shaft fixed to the base, a sleeve rotatably

arranged around the shaft, a hub or a rotor adapted to rotate integrally with the sleeve, and a stator fixed to the base, characterized in that:

the shaft is equipped with a circular thrust plate;

the sleeve and the hub, or the sleeve and the rotor, are formed of an aluminum silicon alloy containing aluminum and silicon as components;

the shaft is formed of a stainless steel made of an iron type alloy containing 10.5 to 32% by weight of Cr and 4 to 13% by weight of Ni; and

a dynamic pressure groove for a radial bearing is provided in an inner peripheral surface of the sleeve which is a portion of the sleeve opposed to the shaft, a first thrust dynamic pressure groove for a thrust bearing is provided at a position of a counter plate opposed to the thrust plate, the counter plate fixed to the hub or the rotor, and being provided at a position opposed to the thrust plate so as to cover the thrust plate and to close a central hole of the sleeve, and a second thrust dynamic pressure groove is provided in a portion of the sleeve opposed to a surface opposite to the surface of the thrust plate opposed to the first thrust dynamic pressure groove.

11. A spindle motor comprising a base, a shaft fixed to the base, a sleeve rotatably arranged around the shaft, a hub or a rotor adapted to rotate integrally with the sleeve, and a stator fixed to the base, characterized in that:

the sleeve and the hub, or the sleeve and the rotor, are formed integrally as an integral member of an aluminum silicon alloy containing aluminum and silicon as components and increasing in coefficient of linear expansion with temperature rise at least in a range of 0°C to 100°C, the shaft having a coefficient of linear expansion larger than the coefficient of linear expansion of the integral member and constant within the

temperature range, the integral member having a hardness lower than a hardness of the shaft, and a dynamic pressure groove for a radial bearing is provided in a portion of the integral member, constituting a softer member, opposed to the shaft.

12. A spindle motor comprising a shaft, a sleeve arranged around the shaft so as to be capable of relative rotation, a hub or a rotor adapted to rotate integrally with the sleeve, and a base to which one of the sleeve and the shaft is fixed, characterized in that:

a circular thrust plate, which is provided on the shaft and has a diameter larger than that of the shaft, and the shaft are formed integrally into an integral member of a stainless steel, with a thrust plate portion of the integral member having an axial thickness of 0.1 to 0.7 mm.

13. A spindle motor comprising a shaft, a sleeve arranged around the shaft so as to be capable of relative rotation, a hub or a rotor adapted to rotate integrally with the sleeve, and a base to which one of the sleeve and the shaft is fixed, characterized in that:

the sleeve and the hub, or the sleeve and the rotor, are formed integrally into an integral member of an aluminum silicon alloy containing aluminum and silicon as components;

the integral member has a coefficient of linear expansion of $10 \times 10^{-6}$ to $17 \times 10^{-6}$ and not larger than a coefficient of linear expansion of the shaft; and

a hardness of the integral member is not higher than that of the shaft, with a dynamic pressure groove for a radial bearing being provided in a portion of the integral member, which is a member of an equivalent or higher softness, opposed to the shaft.

14. A spindle motor comprising a shaft, a sleeve arranged around the shaft so as to be capable of relative rotation, a hub or a rotor adapted to rotate integrally with the sleeve,

and a base to which one of the sleeve and the shaft is fixed, characterized in that:

a circular thrust plate provided on the shaft and the shaft are integrally formed into a first integral member of a stainless steel;

the sleeve and the hub, or the sleeve and the rotor, are formed integrally into a second integral member of an aluminum silicon alloy containing aluminum and silicon as components;

the second integral member has a coefficient of linear expansion of $10 \times 10^{-6}$ to $17 \times 10^{-6}$ as measured in a measurement range of 0°C to 100°C and not larger than a coefficient of linear expansion of the first integral member; and

a hardness of the second integral member is not higher than that of the first integral member, with a dynamic pressure groove for a radial bearing being provided in a portion of the second integral member, which is a member of an equivalent or higher softness, opposed to the shaft.

15. A spindle motor comprising a shaft, a sleeve arranged around the shaft so as to be capable of relative rotation, a hub or a rotor adapted to rotate integrally with the sleeve, and a base to which one of the sleeve and the shaft is fixed, characterized in that:

the sleeve and the hub, or the sleeve and the rotor, are formed integrally as an integral member of an aluminum silicon alloy containing 65 to 84% by weight of Al, 15 to 32% by weight of Si, and 1 to 5% by weight of Cu, etc., the integral member having a coefficient of linear expansion smaller than that of the shaft by $0 \times 10^{-6}$ to $7 \times 10^{-6}$, the integral member having a hardness not higher than that of the shaft, and a dynamic pressure groove for a radial bearing is provided in a portion of the integral member, constituting a member of an equivalent or higher softness, opposed to the shaft.

16. A spindle motor comprising a shaft, a sleeve arranged around the shaft so as to be capable of relative rotation, a hub or a rotor adapted to rotate integrally with the sleeve, and a base to which one of the sleeve and the shaft is fixed, characterized in that:

the sleeve is formed of an aluminum silicon alloy containing 65 to 84% by weight of Al, 15 to 32% by weight of Si, and 1 to 5% by weight of Cu, etc., the sleeve having an inner diameter ranging from 0.6 to 3 mm.

17. A disk drive device which adopts the spindle motor as claimed in any one of Claims 7 through 16 as a drive mechanism for rotating a disk.

18. A method of manufacturing a dynamic pressure bearing device having a base, a shaft fixed to the base, and a sleeve rotatably arranged around the shaft, characterized by comprising:

making an axial thickness of the shaft and the base larger than that in their completed state, and simultaneously cutting, after mounting the shaft into the base, a part of a bottom side portion of the shaft and a part of a bottom side portion of the base such that their cut surfaces become predetermined fixed flat surfaces, achieving their thickness in the completed state.

19. A method of manufacturing a dynamic pressure bearing device having a metal base, a metal shaft fixed to the base, and a sleeve rotatably arranged around the shaft, characterized by comprising:

causing, after mounting the shaft into the base, an electric current to flow through the base to effect intermolecular bonding in a contact portion of the shaft and the base.

20. A method of manufacturing a dynamic pressure bearing device having a shaft, a sleeve arranged so as to be capable of rotating relative to the shaft, and a base to which

one of the shaft and the sleeve is fixed, characterized by comprising:

forming the sleeve and at least a part of a member rotating integrally with the sleeve, or the sleeve and at least a part of a member constituting a fixing member with the sleeve, of an integral member made of an aluminum silicon alloy containing aluminum and silicon as components; and

setting a coefficient of linear expansion of the integral member to a range of $10 \times 10^{-6}$ to $17 \times 10^{-6}$ by adjusting its silicon content, the integral member being formed by forging after mixing and sintering of aluminum powder and silicon powder.

21. A method of manufacturing a dynamic pressure bearing device having a shaft, a sleeve arranged so as to be capable of rotating relative to the shaft, and a base to which one of the shaft and the sleeve is fixed, characterized by comprising:

forming the sleeve of an aluminum silicon alloy containing aluminum and silicon as components, and after setting an inner diameter of the sleeve to a range of 0.6 to 3 mm, providing a dynamic pressure bearing for a radial bearing in an inner peripheral surface of the sleeve by a ball rolling system without mandrel rotation.